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(54) Title: BIOTHERAPEUTICS, DIAGNOSTICS AND RESEARCH REAGENTS

(57) Abstract: The present invention relates in general to real-time analysis of electrochemical deposition (ECD) metal plating solutions, for the purpose of reducing plating defects and achieving high quality metal deposition. The present invention provides various new electrochemical analytical cell designs for reducing cross-contamination and increasing analytical signal strength. The present invention also provides improved plating protocols for increasing potential signal strength and reducing the time required for each measurement cycle. Further, the present invention provides new methods and algorithms for simultaneously determining concentrations of suppressor, accelerator, and leveler in a sample ECD solution within three experimental runs. A particularly preferred embodiment of the present invention provides a method for simultaneously determining concentrations of all three organic additives within a single experimental run by using a single analytical cell, while interactions between such additives are properly accounted for.